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## Thermal Time Requirements for Leaf Appearance of Frontier Balansa Clover

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## Thermal time requirements for leaf appearance of Frontier balansa clover

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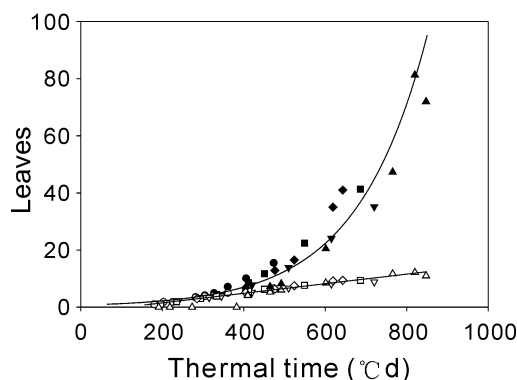
**Key words :** phyllochron, axillary shoot development, *Trifolium michelianum*

**Introduction** Balansa clover (*Trifolium michelianum*) is an annual Mediterranean clover that offers a useful complement to the ubiquitous subterranean clover (*Trifolium subterraneum*) in pasture mixtures of dry, coastal regions of New Zealand. Successful establishment in a perennial pasture requires rapid leaf appearance to capture open spaces in autumn post-emergence. Leaf appearance rate (phyllochron) and the time to branching affect canopy expansion, and understanding the relationship between developmental progression and thermal time gives an easily repeatable, location and season independent comparison between species.

**Materials and Methods** Four reps of fifty seeds of Frontier balansa (TSW=0.9 g) were sown in 10 mm of seed raising mix over a bark and pumice potting mix in controlled environment cabinets (Conviron PGV36). Photoperiod was set to 8 h light & 8 h dark with 4 h transitions. Pots were placed on a slatted table 1.4 m high (top of pots). Temperature was recorded at soil surface using HOBO data logging equipment covered with aluminium foil (Onset Computer Corporation). The plants were hand thinned as required. Phyllochron was calculated from cumulative primary stem leave appearance rate vs. thermal time (Tt). A linear model, as described by (Moot *et al.*, 2002), was used to define base temperature ( $T_b$ ) and Tt requirements for phyllochron; axillary shoot development by exponential curve fitting.

**Results** The number of leaves on the mainstem increased linearly with thermal time. Base temperature for mainstem leaf appearance was estimated at 4.4°C ( $R^2=0.96$ ).

Unifoliate (spade) leaf appearance was estimated at 171°Cd, phyllochron at 60°Cd and axillary shoot development at 463°Cd (Figure 1), using a  $T_b$  of 0°C.



**Figure 1** Mainstem and total leaves of Frontier balansa clover against accumulated thermal time ( $T_b=0^\circ\text{C}$ ).

**Discussion and Conclusion** Rapid expansion of the canopy in autumn is essential for annual clovers to become established before winter temperatures reduce development rate. Thermal time requirements for leaf initiation, phyllochron and onset of axillary shoot development were comparable to subterranean clover (Moot *et al.*, 2003). Phyllochron of white clover (*T. repens*) and ryegrass (*Lolium perenne*) are 94 and 101°Cd (Black *et al.*, 2002), respectively, and would therefore give autumn germinating balansa clover a ~3:2 leaf appearance advantage in a pasture.

### References

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- Acknowledgements: Meat & Wool, New Zealand (www.meatnz.co.nz). Lincoln University Agriculture and Life Science Division.